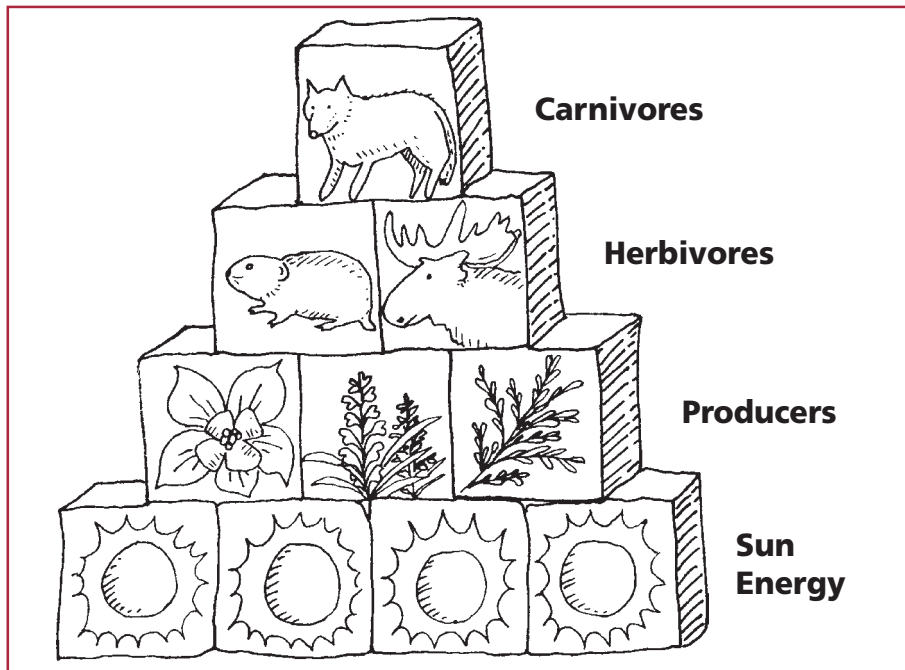


Who Eats Whom?

4 EXTENSIONS *ALERT: ALASKA ECOLOGY CARDS OPTIONAL*



Section 2 ECOLOGY ACTIVITIES

Grade Level: K-8

State Standard: S A-14

Subject: Language arts, science, math

Skills: Classifying, listening, observing

Duration: 60 minutes

Group Size: Any

Setting: Indoors

Vocabulary: Carnivore, consumer, detritivore, food chain, food pyramid, herbivore, producer

Objective:

Students will describe how energy is passed from producers to consumers in food chains.

Teaching Strategy:

Students build a biotic pyramid with milk carton blocks to model a food chain.

Complementary Activities:

"Take a Deep Breath" in Section 1. All the "Investigating (Living Things)" activities, "What Makes an Ecosystem," and "Ecosystem Scavenger Hunt" in Section 3. Also "Create and Destroy" and "Spinning a Yarn about Ecosystems" in Section 4.

Materials:

For the class: 10 empty paper milk cartons (quart or half gallon size); pictures of plants, seeds, algae, herbivores, carnivores, humans (*see following pages or Alaska Ecology Cards*), construction paper – yellow and other colors, scissors, pencils, markers, rulers; yarn or string, pencil and paper.

Background:

See **INSIGHTS Section 2, Ecosystems – Community Connections** and its "Track the Energy" fact sheet.

Procedure:

NOTE: Teachers of younger students may need to build the boxes in Steps 4 and 5 *in advance*.

1. Hold a class discussion about students' favorite foods and list them on the board. How many of the listed foods are made of plants (**producers**)? How many are from animals that eat plants (**herbivores**)? How many of the listed foods are from animals that eat other animals (**carnivores**)? (For example, arctic char and trout eat insects.)

2. Through class discussion, follow some of the students' favorite foods back through a **food chain** so students recognize that all the food we eat is ultimately based on the consumption of plants. Plants, in turn, depend on the **nonliving** environment (*sun, water, and nutrients*).



3. Tell students they will build an example of a food web to follow the path of the sun's energy through an ecosystem.

4. Working in pairs, students cut the top off a milk carton and measure one side of the bottom of the carton. Using that measurement from the bottom of the carton, measure the same distance up the sides of the carton. Cut the carton to get two square boxes, one open on both ends, and the one open on just one end.

5. Stuff the open-ended box sideways into the other box to form a cube. Tape the cube so that it is closed. The class should make 10 milk carton cubes to complete the set.

6. Decorate four of the cubes with pictures of the sun or put yellow paper on all sides.

7. Paste or draw pictures of Alaska plants and seeds on three of the cubes.

8. Put pictures of plant-eating animals (such as moose or caribou) on two cubes, and use the last block for meat-eating animals. Encourage students to include humans in these last two steps.

9. Have students build a food pyramid as a class. Place the four sun cubes side-by-side as the base, then stack the three plant cubes on top of the sun cubes. Place the herbivore (plant-eating) cubes on the third layer, and the carnivore (meat-eating) cube on top. Discuss what the class has created.

9. Discuss why there are more plants and seeds than plant-eating animals, and why there are even fewer carnivores. *The amount of available energy limits the number of living things in a particular ecosystem. Less energy is available to pass on at every link of a food chain. As a result, carnivores are less numerous than herbivores, and food chains rarely have more than four links.*

10. Ask students to take away one plant block. *At least part of the structure should fall.* What happens when you remove a sun block? What happens if you take out a meat-eater? *(It's not a pyramid anymore.)*

11. Talk about the biotic pyramid as a model of the balance worked out by nature. What happens to that balance if there are no meat-eaters? *(The population of herbivores would eat all the plants, because predators would not limit the population.)*

12. Explain that nature is not as simple as their model of the biotic pyramid. What major role is missing? *(Something to recycle dead things – **detritivores**.)* *There are so many connections that a **food web** is a more accurate model to show how energy and minerals are passed from the nonliving surroundings to living things.*

VARIATION

Cut strips of construction paper one-half inch wide; use one color *paper (except yellow)* for each level of the food chain pyramid. Write the name, or draw or glue a picture of a living thing on each strip. Staple or glue the strips together to form chains.

When each student (or pair) has finished making a chain, ask where the chains really start. What is missing from the chains? *(The sun's energy.)* Use a large yellow circle as the sun, and have students attach their chains to the sun with a yellow link. Hang across a corner or from the ceiling to model several food chains.

Evaluation:

1. Given a list of producers, omnivores, carnivores and the sun, students will draw their own food chains or biotic pyramids and label the different levels.

2. *For older students:* Students list the different levels of a biotic pyramid. They explain why a food chain or a food web is a better model for showing the connections between the levels.

3. Give each student a piece of lined paper and strips of construction paper, including yellow. List an example of each of the five food chain levels on the board (producers, herbivores, carnivores, omnivores, detritivores). Have students build their chains independently. What would happen if another chain were added? *(It would become a food web.)* What would happen if you took a link away? What link represents the most energy consumption and why?



EXTENSIONS:

A. **Role play the layers of a biotic pyramid.** Students become the “cubes” of the food pyramid by stacking themselves on top of one another on their hands and knees. Students wear name tags that indicate whether they are producers, herbivores, or carnivores.

B. **Expand knowledge of food chains.** Ask students if they know a name for animals which eat both plants and animals (**omnivores**). Ask what fungi eat or what scavenging herring gulls eat. How do these living things fit in a food chain? *Explain that dead things and wastes from all levels of the pyramid return energy and nutrients to the soil where the energy becomes available again to producers. Suggest fertilizer as an example of waste that provides nutrients for producers.*

C. **Research their cube organisms.** Older students might research organisms for their cubes, to determine living and nonliving things that their plants or animals need to survive.

D. **Complete food chain worksheets.** Students complete one of the food chain worksheets (following pages).

Credits:

Adapted with permission from Earth Child by Kathryn Sheehan and Mary Waidner. Tulsa: Council Oak Books, 1992.

Curriculum Connections:

(See appendix for full citations)

Books:

Ecology (Pollock)

Food Chains (Silverstein)

The Hunt for Food (Ganeri)

The Magic School Bus Gets Eaten: A Book About Food Chains (Reif)

What are Food Chains and Webs? (Kalman)

Who Eats What? Food Chains and Food Webs (Lauber)

Media:

All Things are Connected (Video) (North Carolina Wildlife Commission)

Into the Forest, Krill, Onto the Desert, Predator (Nature's Food Chain Games) (Ampersand Press)

The Magic School Bus Gets Eaten (Video)

Teacher Resources:

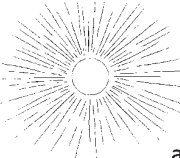






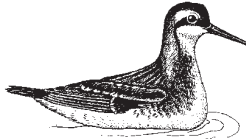




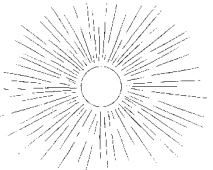

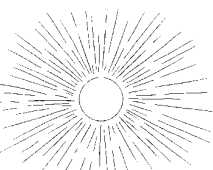
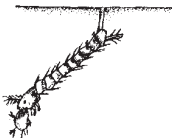
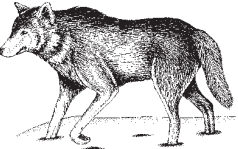



(See appendix)



K-3 Food Chains

Name: _____

Color and cut out the cards below and put them in order to make 4 food chains found in Alaska ecosystems.

1	2	3	4
 and minerals	Kelp  I make food from energy and minerals.	 I eat kelp.	Dwarf Dogwood  I make food from energy and minerals.
Merlin  I eat pine grosbeaks.	Pine Grosbeak  I eat the berries of a dwarf dogwood.	Bacteria  I eat waste. I live in a wetland.	Phalarope  I eat mosquito larvae.
Mushroom  I eat dead things in forests.	Springtail  I eat dead things on the tundra.	 and minerals	Sea Star  I eat snails.
 and minerals	Alpine Sunflower  I make food from energy and minerals.	 and minerals	Mosquito Larvae  I eat algae.
Wolf  I eat Dall sheep lambs.	Algae  I make my food from energy and minerals.	Dall Sheep  I eat moss campion.	Sea Cucumber  I eat wastes in the sea.

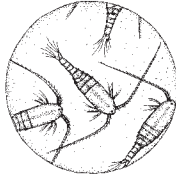


4-8 Food Chains

DIRECTIONS: Color the producer cards green, the herbivore cards yellow, the carnivore cards red, and the detritivore cards blue. Then cut the cards apart, find the four food chains, and paste the food chains onto another sheet of paper. Write your name on your food chain paper.



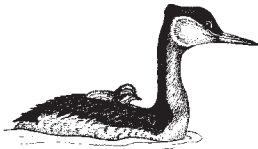
This is a diatom.
It photosynthesizes its food.



This is a copepod.
It eats diatoms.



This is a Dall sheep. It eats low-growing alpine plants like alpine avens.



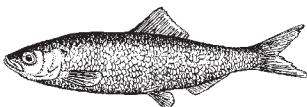
This is a grebe. It eats small fish like sticklebacks.



This is a raven.
It feeds on dead animals.



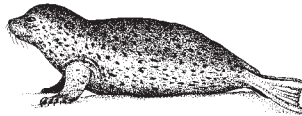
This is bacteria. It feeds on dead plants and animals and waste materials.



This is a herring. It feeds on zooplankton such as copepods.



This is a redpoll.
It eats birch seeds.



This is a harbor seal. It eats ocean fish such as herring.



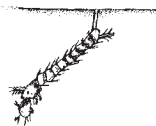
This is a merlin.
It eats small birds.



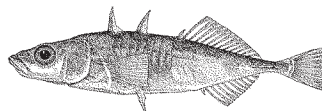
This is an alpine avens.
It photosynthesizes its food.



This is algae, a type of protist.
It photosynthesizes its food.



This is mosquito larvae. It eats protists such as algae.

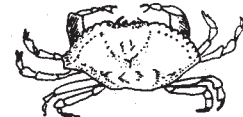


This is a 3-spine stickleback.
It eats aquatic insects like dragonfly larvae.

This is a *Pholiotus* mushroom. It gives off chemicals that digest dead plants and wastes. Then it soaks up the digested material.



This is a birch tree. It photosynthesizes its food.



This is a crab. It eats dead things and waste material on the ocean floor.



This is a killer whale.
It eats fish and sometimes other marine mammals.



This is a dragonfly larvae. It eats the aquatic larvae of other insects such as mosquitos.



This is a wolf. It eats moose, caribou, and sheep, especially young animals.





























This is a fox. It eats just about anything it can catch, including small mammals, small birds, bird eggs, and dead animals.



9-12 Food Chains

Place a P next to the producers, an H next to the herbivores, a C next to the carnivores, a D next to the detritivores, and an O next to the omnivores. How many food chains can you find on this worksheet? On a separate piece of paper, diagram an ocean, wetland, forest, or tundra food web that shows all the organisms (pictured or listed) on this worksheet, plus at least 10 others that you know.

	This mushroom secretes chemicals to digest dead plants and wastes. It absorbs the digested material.		This is a diatom, a type of protist. It photosynthesizes its food.
	This is a copepod. It eats diatoms.		This is a redpoll. It eats the seeds of birch, willow, and other shrubs and trees.
	This is a birch tree. It photosynthesizes its food.		This is a harbor seal. It eats ocean fish such as herring.
	This is an alpine avens. It photosynthesizes its food.		This is a Tanner crab. It eats dead things and waste material on the ocean floor.
	This is a grebe. It eats small fish, like sticklebacks in fresh water, or sandlance in ocean water.		This is a Dall sheep. It eats low-growing alpine plants like alpine avens.
	This is a merlin. It eats small birds in forests or tundra areas.		This is a dragonfly larvae. It eats the aquatic larvae of other insects such as mosquitos.
	This is algae, a type of protist. It photosynthesizes its food.		Killer whales eat fish (herring and salmon especially) and sometimes seals, sealions, and other whales.
	This is a raven. It feeds primarily on dead things (called "carriion").		This bacteria lives in the soil. It feeds on dead plants and animals and waste materials.
	This is a mosquito larvae. It eats protists such as algae.		This pika is a small mammal that lives in alpine areas and feeds on grasses and herbs.
	This is a wolf. It eats moose, caribou, and sheep, especially young animals.		Red foxes eat just about anything including small mammals, small birds, bird eggs, berries, and dead animals.
	This is a sandlance. It feeds on zooplankton such as copepods, amphipods, and euphausiids.		Marmots are small mammals that live in alpine areas and feed on grasses and herbs.
	This is a 3-spine stickleback. It eats aquatic insects like dragonfly larvae.		Golden eagles live in alpine areas and feed on ptarmigan, small mammals, and (occasionally) newborn Dall sheep lamb, mountain goat kid, and caribou calf.
	This is a shrike. It eats small birds, insects, and small mammals in tundra and forest areas.		Adult longspurs feed on insects and the seeds of various tundra plants.
	This is a loon. It eats mainly small fish in fresh and saltwater. They occasionally eat large aquatic insects.		This amoeba eats other protists, including algae and protozoans.



ANSWERS TO FOOD CHAIN WORKSHEETS

Grades K-3: The four food chains all begin with sunlight and minerals. After these two cards, they are as follows: 1. kelp—snail—sea star—sea cucumber; 2. dwarf dogwood—pine grosbeak—merlin—mushroom; 3. algae—mosquito larvae—phalarope—bacteria; 4. alpine sunflower—Dall sheep—wolf—springtail.

Grades 4-8: 1. diatom—copepod—herring—seal—killer whale—crab; 2. birch—redpoll—merlin—mushroom; 3. alpine avens—Dall sheep—wolf—raven; 4. green algae—mosquito larvae—dragonfly larvae—stickleback—grebe—fox—bacteria. The bacteria and raven can be interchanged.

Grades 9-12: 1. mushroom-D, copepod-H, willow-P, alpine avens-P, grebe-C, merlin-C, green algae-P, raven-D, mosquito larvae-H, wolf-C, sandlance-C, stickleback-C, shrike-C, loon-C, diatom-P, redpoll-H, seal-C, crab-D, Dall sheep-H, dragonfly-C, killer whale-C, bacteria-D, pika-H, red fox-O, marmot-H, golden eagle-C, longspur-O, amoeba-C.

